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OPEN ACCESS

2022

Sawmill waste as alternative energy source for cooking – An old climate action approach

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1. Nature of identified problem

Although there have been several introductions of novel sources of energy as a result of scientific breakthroughs, the forest resources of developing countries are being ravaged due to the increasing demands for wood. Most people in rural parts of the world have not been able to adopt the breakthroughs in clean energy, and thus, still rely on wood for cooking. This can be attributed to the cost of alternative energy sources for cooking compared to the livelihoods of most rural people (Izekor & Osayimwen, 2010). The pollution of the atmosphere through the burning of sawmill waste has been a longstanding environmental problem to the sawmill industry and the community at large. The current situation at hand is the pollution caused by the burning of sawmill waste as practiced by most sawmill industries. This pollutes the atmosphere which further worsens the case of climate change, thus rendering the efforts of concerned stakeholders useless.

Climate change is an alteration and modification in the statistical arrangements of patterns in weather parameters for a considerable number of years (minimum of 30 years). Global climate change is caused by the accumulation or increase in the concentration of greenhouse gases (water vapor, CO_2, CH_4, CFC_s). Human activities such as coal burning, fossil fuel combustion (which releases carbon dioxide), deforestation (because forests remove carbon from the environment), methane which is discharged by wastes, and some industrial processes have led to an increase in greenhouse gases concentration. One other risk related to the burning of so great a heap of sawmill waste is the causing of global warming; the slow upsurge in the atmospheric temperature of the earth and oceans and its projected continuation owing to the rise in harmful gases from the industrial revolution era. The atmospheric temperature around the surface of the earth gets warmed via the phenomenon known as the greenhouse effect. The greenhouse gas in the earth's atmospheric zone sucks and releases rays within the infrared range. The earth's atmosphere, thus acts like the glass of a greenhouse, hence the 'greenhouse effect. This process is the main cause of the greenhouse effect (Hoegh-Guldberg *et al*., 2018; Reichle, 2020).

The other situation at hand is the dependence on forest resources for firewood by a great number of people in Africa. This activity is a catalyst for disaster through the process of deforestation. Each day, hundreds of trees are cut and used as a source of fuelwood for cooking (Nunez, 2019). As part of the United Nations' Agenda, by 2030, we might have taken urgent action to combat climate change and its impacts (see SDG 13). And this can be realized if some climate action-oriented time-honoured methods and systems are embraced. One of such interventions could be the modification of the traditional sawdust stove for adoption. The use of sawmill waste could be a cheaper and better alternative to fuelwood which will go a long way to forestall the deforestation situation in most parts of the world. It is therefore important to devise a way out to help reduce the number of greenhouse gases that are released into the atmosphere by finding a use for the great heap of sawmill waste.

2. The intervention

Sawdust stoves that were in the system some few decades ago can be remodelled so that people find an economic value for sawmill waste instead of it being burnt, causing pollution to the environment, and depleting the ozone layer.

2.1. The design principle

A prototype sawdust stove was designed and fabricated with a metallic paint container and a tin of milk to reduce the cost of design. It also has a seat on which to place cooking pots/utensils. This was done to evaluate the performance of the system. Figure 1 below is a schematic design of a prototyped stove with a front elevation with dimensions of 120 mm against 77 mm, and an air vent diameter of 10 mm. The external and internal diameters of the container from the plan are 89 mm and 84 mm. However, the pot seat was designed at a diameter of 83 mm.

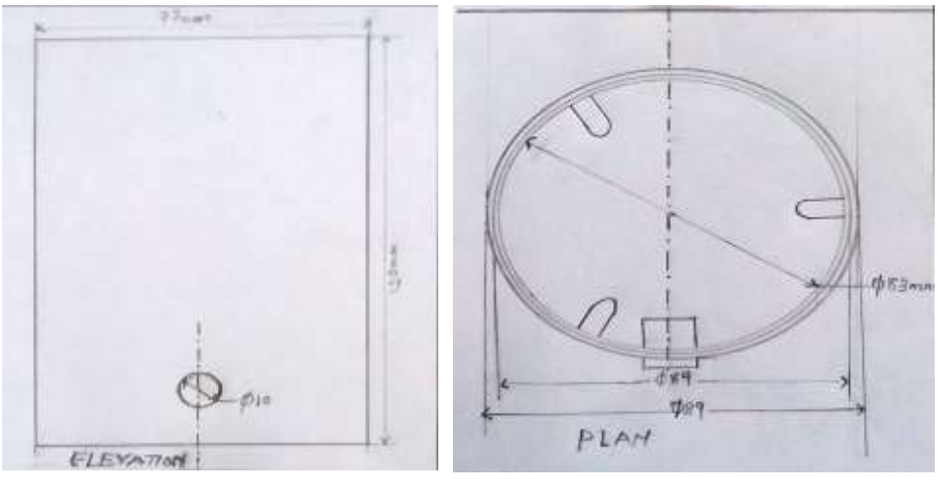

Figure 1: A schematic representation of sawdust stove

2.2. The operating principle

The stove works on the principle of combustion. Air supports burning, therefore, the free flow of oxygen through the created chimney causes the stove to be in operation and it can work for a longer time depending on its size and height. It must be noted, however, that good airflow and the dryness of the sawdust waste are important for efficient combustion. Before the fire can be set up in the stove, a 2-inch PVC round pipe should be placed vertically in the middle of the stove to align perpendicularly with the air vent (Figure 1). Dried sawdust should then be compacted gently around the pipe with the help of a wood log to form a briquette that can be burnt slowly. The PVC pipe should be carefully removed to create a chimney. Fire can be set at the air vent and by airflow action, the fire will rise through the chimney to the top, where it can be tapped for cooking (Figure 1).

Figure 2: Paint-Container-fabricated sawdust stove for trial

2.3. Importance of using the sawdust stove

- The sawdust stove will provide users with cheaper alternative energy for cooking since the sawdust is freely available.
- The introduction of the sawdust stove is environmentally friendly in terms of material requirement since it fully supports recycling.
- The sawdust stove is easier to fabricate at little or no cost.
- The stove can be used by all classes of people with ease, with few modifications

3. Conclusion

Preliminary testing of the prototype sawdust stove has shown promising results with good upscaling potential.

4. Recommendation

It is therefore recommended that the design is optimized to improve working efficiency. Moreover, several trials should be conducted with some inhabitants in some study areas to assess the acceptability of the solution and facilitate future adoption of the intervention.

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